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AQUATIC ECOSYSTEM INVENTORY

Macroinvertebrate Analysis

Annual Progress Report

NATIONAL PARK SERVICE

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Intermountain Region

AQUATIC ECOSYSTEM INVENTORY
Macroinvertebrate Analysis

NATIONAL PARK SERVICE
AND
U.S. FISH AND WILDLIFE SERVICE
YELLOWSTONE NATIONAL PARK
1984-1986

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AQUATIC ECOSYSTEM ANALYSIS

FOR SODA BUTTE CREEK

1984-1986

BACKGROUND AND METHODS

In recent years land managers on many of our forests and BLM districts in the west have improved the stability and reliability of land management plans and decisions by sampling aquatic organisms which act as natural monitors of management activities within the drainages on public lands.

During short-term exposure to water of poor quality or adverse changes in habitat, organisms that cannot tolerate the stress are destroyed and the aquatic macroinvertebrate community structure changes. Since aquatic organisms respond to their total environment, they can become an effective tool for detection of environmental changes.

Our analysis of aquatic ecosystems is based upon multiple factors including:

1. Various macroinvertebrate data - Community dry-weight biomass/sample expressed in gm/m^2; number of individuals per taxa (resident populations?); DAT Diversity Index, which combines a measure of dominance and number of taxa; habit, habitat and feeding preferences of individual taxa or species; specific tolerances of taxa; community composition; and BCI (Biotic Condition Index), which indicates as a percentage how close an aquatic ecosystem is to its own potential.

2. Physical parameter data and

3. Water chemistry data

Effective use of the Biotic Condition Index (BCI) depends upon the availability of data on stream gradient, natural capability of instream substrate (may not be the composition present if man-influenced sedimentation is found at the sample station), total alkalinity, and sulfate in mg/l.

Because of the way that macroinvertebrates occupy space within a stream, it generally takes at least three samples to

represent the community accurately at a given station. One sample per station costs less but has little value for aquatic habitat assessment, one never knows if such single samples represent the best, the worst or an average of possible conditions at the sampling site. Also as a side benefit, three samples per station provides a basis for various statistical analyses, if random samples are all taken from a rubble substrate in as similar habitat as possible, taking into account mainly the velocity of flow and depth in the stream. Biologists have found that compared to other sampling devices, the Winget-modified surber net yields the highest coefficient of correlation (similarity of samples).

A stream's natural potential for productivity, habitat quality and water quality can be compared to the "actual" by taking quantitative samples of aquatic macroinvertebrates. Careful analysis of macroinvertebrate communities can reveal condition and trends in aquatic ecosystems. Sampling and analysis is conducted in accordance with procedures outlined in FSH R-4 2609.23, March 1985, Fisheries Habitat Surveys Handbook.

Soda Butte Creek flows through a mining area near Cooke City Montana, then across the Wyoming border into Yellowstone National Park. Soda Butte Creek is a tributary to the popular Lamar River trout fishery, which is a tributary to the Yellowstone River with its coveted trout fishery. The habitat quality and water quality of Soda Butte Creek are of concern because of potential adverse effects that they could have upon major trout fisheries in Yellowstone National Park.

Soda Butte Creek has been sampled during various months of the year to provide a basis for evaluating the effects of the mine area upon this aquatic ecosystem. Months monitored include June, July, August, September, October, March, April, and May over a three year period.

Five stations were set up, with the upper Station (1) established as a control above the mining area. During the late winter and early spring months access to this upper station was difficult and the stream was covered with ice. During these months samples were taken in a reach of stream associated with some mine tailings which diminishes its value as a control station.

Station 2 is directly below the mine site, Station 3 between Cooke City and the community of Silver Gate, Station 4 just below Silver Gate at the Montana/Wyoming border, and

Station 5 about one mile into the Park.

SODA BUTTE CREEK

Aquatic macroinvertebrate samples were collected at five stations on Soda Butte Creek, from above Cooke City to about a mile within the Park. The macroinvertebrate samples were not taken according to the Intermountain Region Forest Service standard procedure but samples were taken with a surber net and processed streamside, collecting only those specimens visible to the naked eye.

Although the data cannot be evaluated based upon the DAT Diversity Index scale, the BCI scale or the standing crop, there are indications on most sampling dates of a gradation of ecosystem quality which can be seen particularly in the DAT Diversity Index values and the standing crop in some instances. Also, the diversity and density of species indicated in the computer printouts show relative ecosystem quality at each of the stations.

On a majority of the sampling dates the DAT Diversity Index value was lowest at the station directly below the mining area (Station 2), with Station 3 generally showing some recovery, Station 4 even more recovery and Station 5 in most cases having a fairly good aquatic macroinvertebrate community including more clean water species with higher numbers of individuals per species than at the other stations. On some sampling dates there appeared to be stress conditions at each of the sampling stations.

Part of the complication in data continuity was the variety of field personnel who collected the samples over the three year period of time. It appeared that the best samples collected were those taken in 1986 by an aquatic specialist. In the future, samples taken in a more quantitative way and sent to the Aquatic Ecosystem Analysis Laboratory for processing should provide more reliable data for evaluation of conditions and trends in this ecyosystem.

In general, it was observed that there were stress conditions indicated by the macroinvertebrate community at Station 2, often with some recovery in reaches downstream from the mining area. For example, in July 1984, the DAT Diversity Index at Station 1 was 2.7, at Station 2 this value dipped to 1.2, at Station 3 there was some recovery as it went to 2.1, at Station 4 even more recovery at 3.4, and finally at Station 5 the DAT Diversity Index value was 6.1. This general pattern was

also observed in August and in September of 1984. It became particularly evident in May of 1986 and in July of 1986, the contrast was seen in both the DAT Diversity Index and the standing crop.

Community biomass was difficult to evaluate also. In a quantitative sample the biomass would be expected to be between 2 and 3 gm/m^2 instead of less than 1 gm/m^2 in a stream with an alkalinity between 50 and 120 mg/l. The sulfate concentration at Stations 3, 4 and 5 in June of 1984 would be limiting to the most sensitive macroinvertebrate species. At Station 2, sulfate concentrations of 50 mg/l in September and 70 mg/l in October, would be limiting to the most sensitive macroinvertebtrate species. On most of the sampling dates sulfate values were less than 50 mg/l and should not have been a problem.

In some of the 1981 sample data copper concentrations were indicated as less than .03 mg/l. The threshold value for some of the more sensitive macroinvertebrates is .02 mg/l copper, so back in 1981 there may have been some dates when copper was a limiting factor. In more recent data there were no indications of copper reaching the threshold value.

Also measured were iron concentrations, which on each of the sampling dates fell short of the 2.0 mg/l threshold for macroinvertebrates sensitive to iron. Likewise, manganese was measured on several occasions and did not reach the 1.0 mg/l threshold value.

There were some clean water species present, particularly at the lower Station (5) on most of the sampling dates which indicated fairly good water quality in that reach of stream. Future sampling will reveal the presence or absence of resident population numbers of clean water species which gives a better indication of water quality. In some cases one or two individuals of a clean water species have been found in a devasted reach of stream, but not in resident population numbers. It is important to know if the species is able to maintain a resident population within a reach of stream.

The potential for a fishery appeared to be poor at Stations 1 and 2, and to improve in a downstream direction. Clean water species particularly at Stations 4 and 5 indicated that there could be suitable spawning substrate and water chemistry in those reaches of stream. The macroinvertebrate biomass found at Station 5 in May 1986 would be sufficient to provide nutrients for a resident fish population.

With the collection procedure used most of the BCI values were not valid, however the macroinvertebrate data did indicate that there were ecosystem impacts in the area below the mine at Station 2. It appeared there may be opportunities for management to improve the instream habitat and water quality conditions by management action to minimize effects from mine tailings upon Soda Butte Creek.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

Aquatic Ecosystem Analysis Laboratory
105 Page School
Brigham Young University
Provo, Utah 84602

A. Investigator Bob Greswell

Forest/District USFWS, National Parks Service, Yellowstone N.P.

Stream SODA BUTTE CREEK

State/County Wyoming

Forest Service Cat. No.

B.

Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m^2 (mean)	Biotic Condition Index BCI
1	6-26-84	2.2	0.1	92
2	6-26-84	2.1	0.1	
3	6-26-84	0.7	0.1	
4	6-26-84	2.4	0.1	
5	6-26-84	2.9	0.1	
1	7-31-84	2.7	0.2	
2	7-31-84	1.2	0.1	
3	7-31-84	2.1	0.13	
4	7-31-84	3.4	0.2	
5	7-31-84	6.1	0.2	
1	8-28-84	2.9	0.1	
2	8-28-84	0.8	0.1	60
3	8-28-84	4.4	0.1	
4	8-28-84	2.9	0.1	
5	8-28-84	3.1	0.2	

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	above 90
Good	11 - 17	1.6 - 4.0	75 - 90
Fair	6 - 10	0.6 - 1.5	below 75
Poor	0 - 5	0.0 - 0.5	below 75

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USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

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Brigham Young University
Provo, Utah 84602

A. Investigator Bob Greswell

Forest/District USFWS - Yellowstone National Park

Stream SODA BUTTE CREEK

State/County Wyoming

Forest Service Cat. No.

B.

Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m^2 (mean)	Biotic Condition Index BCI
2	9-28-84	1.3	0.1	
4	9-28-84	6.3	0.7	
5	9-28-84	5.2	0.4	
1	10-31-84	0.5	0.1	
3	10-31-84	4.5	005	
4	10-31-84	3.2	0.1	
5	10-31-84	5.6	0.4	
1	12-4-84	2.3	0.1	
1	3-6-85	4.3	0.5	
4	3-6-85	0.5	0.1	
5	3-6-85	2.1	0.1	
1	4-16-85	3.0	0.1	
2	4-16-85	2.7	0.1	
5	4-16-85	3.4	0.2	

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	above 90
Good	11 - 17	1.6 - 4.0	75 - 90
Fair	6 - 10	0.6 - 1.5	below 75
Poor	0 - 5	0.0 - 0.5	below 75

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

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105 Page School
Brigham Young University
Provo, Utah 84602

A. Investigator Bob Greswell

Forest/District USFWS - Yellowstone National Park

Stream SODA BUTTE CREEK

State/County Wyoming

Forest Service Cat. No.

B.

Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m^2 (mean)	Biotic Condition Index BCI
1	5-16-85	2.2	0.1	65
2	5-16-85	4.9	0.1	
3	5-16-85	3.0	0.3	
4	5-16-85	1.9	0.1	82
5	5-16-85	2.0	0.2	
1	7-25-85	1.0	0.1	
2	7-25-85	1.0	0.1	
3	7-25-85	0.7	0.1	72
4	7-25-85	1.0	0.1	
5	7-25-85	1.0	0.1	
1	5-2-86	6.3	0.1	
2	5-2-86	1.0	0.1	
3	5-2-86	6.4	0.5	
4	5-2-86	5.8	0.5	
5	5-2-86	10.4	1.9	

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	above 90
Good	11 - 17	1.6 - 4.0	75 - 90
Fair	6 - 10	0.6 - 1.5	below 75
Poor	0 - 5	0.0 - 0.5	below 75

FS-R4-2600-15(3/85)

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

Aquatic Ecosystem Analysis Laboratory
105 Page School
Brigham Young University
Provo, Utah 84602

A. Investigator Bob Greswell

Forest/District USFWS - Yellowstone National Park

Stream SODA BUTTE CREEK

State/County Wyoming

Forest Service Cat. No.

B.

Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m^2 (mean)	Biotic Condition Index BCI
1	7-24-86	2.8	0.2	
2	7-24-86	0.9	0.1	
3	7-24-86	3.2	0.2	
4	7-24-86	4.0	0.3	
5	7-24-86	4.4	0.4	

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	above 90
Good	11 - 17	1.6 - 4.0	75 - 90
Fair	6 - 10	0.6 - 1.5	below 75
Poor	0 - 5	0.0 - 0.5	below 75

FS-R4-2600-1

TOTAL SAMPLE STATISTICS

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	7	68.	39.	98.	27.08	22.94	39.74	2.2856	0.1846	59.	54.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		—1	32.28	1.509	30.	45.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		—1	3.59	0.555	48.	27.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		S, O	7.17	0.856	72.	62.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		S	10.76	1.032	24.	25.	
INSECTA	DIPTERA	CHIRONOMIDAE			S, O	7.17	0.856	108.	92.	
OLIGOCHAETA					O, S	3.59	0.555	108.	60.	
				TOTALS		68.15	1.833			0.10

Symbols used:

— = clean water

—1 = moderately tolerant

S = sediment tolerant

O = organic enrichment tolerant

▭ = shredders - (require deciduous plants in riparian habitat)

TOTAL SAMPLE STATISTICS

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 26 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	5	79.	30.	128.	44.80	32.78	56.77	2.0207	0.1312	38.	40.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		7.17	0.856	21.	18.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		25.11	1.400	30.	42.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		14.35	1.157	21.	24.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		3.59	0.555	48.	27.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		28.69	1.458	72.	105.	
				TOTALS	78.91	1.897			0.10

TOTAL SAMPLE STATISTICS

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 26 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	3	32.	21.	44.	10.76	19.25	33.33	0.9864	0.4059	41.	37.

SPECIES ANALYSES

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA			25.11	1.400	30.	42.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA			3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS			3.59	0.555	72.	40.	
				TOTALS		32.28	1.509			0.10

TOTAL SAMPLE STATISTICS

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	7	115.	77.	152.	34.59	17.40	30.14	1.8419	0.3536	54.	50.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		11	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		11	64.56	1.810	30.	54.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		11	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	11	7.17	0.856	18.	15.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		00	28.69	1.458	72.	105.	
INSECTA	DIPTERA	CHIRONOMIDAE			00	3.59	0.555	108.	60.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		0	3.59	0.555	108.	60.	
				TOTALS		114.77	2.060			0.10

TOTAL SAMPLE STATISTICS

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	6	82.	18.	147.	59.26	41.48	71.84	2.0329	0.2166	29.	36.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 06 26 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	28.69	1.458	30.	44.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	10.76	1.032	18.	19.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	INERMIS	1	3.59	0.555	48.	27.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	1	3.59	0.555	2.	1.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		10	32.28	1.509	72.	109.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		1	3.59	0.555	6.	3.	
				TOTALS		82.49	1.916			0.10

TOTAL SAMPLE STATISTICS

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	7	215.	173.	257.	38.80	10.41	18.03	1.6888	0.4068	43.	44.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	17.93	1.254	21.	26.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	39.45	1.596	30.	48.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	136.29	2.134	72.	154.	
INSECTA	PLECOPTERA	CHLOROPERLIDAE			1	7.17	0.856	24.	21.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		1	7.17	0.856	24.	21.	
INSECTA	PLECOPTERA	PERLIDAE				3.59	0.555	24.	13.	
INSECTA	DIPTERA	CHIRONOMIDAE			5,0	3.59	0.555	108.	60.	
				TOTALS		215.20	2.333			0.20

TOTAL SAMPLE STATISTICS

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	3	57.	-21.	135.	71.64	72.08	124.84	0.6686	0.6115	31.	48.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5.0	50.21	1.701	72.	122.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA			3.59	0.555	16.	9.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE	ELSIS	—	3.59	0.555	6.	3.	
				TOTALS		57.39	1.759			0.10

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	5	118.	30.	207.	81.24	39.63	68.63	1.6415	0.2930	50.	47.

SPECIES ANALYSES

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		—	60.97	1.785	30.	54.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		—	10.76	1.032	21.	22.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	39.45	1.596	72.	115.	
INSECTA	DIPTERA	CHIRONOMIDAE			50	3.59	0.555	108.	60.	
				TOTALS		118.36	2.073			0.13

TOTAL SAMPLE STATISTICS

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	10	187.	151.	222.	32.87	10.18	17.63	2.2537	0.3449	23.	30.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		43.04	1.634	30.	49.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	14.35	1.157	18.	21.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	3.59	0.555	2.	1.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	TIBIALIS	7.17	0.856	24.	21.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		93.25	1.970	72.	142.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		3.59	0.555	16.	9.	
INSECTA	PLECOPTERA	PERLIDAE			3.59	0.555	24.	13.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		7.17	0.856	6.	5.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		7.17	0.856	18.	15.	
				TOTALS	186.51	2.271			0.20

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	12	165.	151.	179.	12.42	4.35	7.53	2.7037	0.2508	26.	30.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		11	46.63	1.669	30.	50.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	3.59	0.555	18.	10.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	INERMIS	5	3.59	0.555	48.	27.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	—	3.59	0.555	2.	1.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	TIBIALIS	1	3.59	0.555	24.	13.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		50	57.39	1.759	72.	127.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		—	7.17	0.856	16.	14.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		—	7.17	0.856	6.	5.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	17.93	1.254	18.	23.	
INSECTA	TRICHOPTERA	GLOSSOSOMATIDAE	GLOSSOSOMA		1	7.17	0.856	24.	21.	
INSECTA	DIPTERA	TIPULIDAE	HEXATOMA		5	3.59	0.555	36.	20.	
				TOTALS		164.99	2.217			0.20

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	9	93.	23.	164.	64.86	40.16	69.55	2.3887	0.2463	37.	40.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		1	7.17	0.856	21.	18.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	7.17	0.856	30.	26.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	46.63	1.669	72.	120.	
INSECTA	PLECOPTERA	CHLOROPERLIDAE			1	3.59	0.555	24.	13.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		1	14.35	1.157	16.	19.	
INSECTA	PLECOPTERA	PELTOPERLIDAE	YORAPERLA		1	3.59	0.555	24.	13.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	3.59	0.555	18.	10.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		0	3.59	0.555	108.	60.	
				TOTALS		93.25	1.970			0.10

TOTAL SAMPLE STATISTICS

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	3	14.	8.	21.	6.21	25.00	43.30	1.5000	0.0515	78.	83.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 24 84

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	PLECOPTERA	PERLIDAE	HESPEROPERLA		3.59	0.555	18.	10.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		3.59	0.555	108.	60.	
INSECTA	DIPTERA	CHIRONOMIDAE			7.17	0.856	108.	92.	
				TOTALS	14.35	1.157			0.10

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	8	118.	78.	159.	37.27	18.18	31.49	2.7550	0.0803	42.	41.

SPECIES ANALYSES

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		1	7.17	0.856	21.	18.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	7.17	0.856	30.	26.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	21.52	1.333	21.	28.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	7.17	0.856	72.	62.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		1	32.28	1.509	16.	24.	
INSECTA	PLECOPTERA	PERLODIDAE				21.52	1.333	48.	64.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	7.17	0.856	18.	15.	
INSECTA	DIPTERA	CHIRONOMIDAE			5,0	14.35	1.157	108.	125.	
				TOTALS		118.36	2.073			0.10

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	6	97.	38.	155.	53.80	32.08	55.56	2.0634	0.2102	44.	40.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		43.04	1.634	21.	34.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		3.59	0.555	30.	17.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		25.11	1.400	72.	101.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		14.36	1.157	16.	19.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		7.17	0.856	18.	15.	
INSECTA	DIPTERA	CHIRONOMIDAE			3.59	0.555	108.	60.	
				TOTALS	96.84	1.986			0.10

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	9	136.	112.	161.	22.40	9.49	16.43	1.9097	0.4172	33.	30.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 28 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	89.67	1.953	21.	41.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		—	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	T	10.76	1.032	18.	19.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		S,O	7.17	0.856	72.	62.	
INSECTA	PLECOPTERA	PERLODIDAE	SKWALA		—	7.17	0.856	18.	15.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		—	3.59	0.555	16.	9.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		—	3.59	0.555	6.	3.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		T	7.17	0.856	18.	15.	
NEMATODA					S	3.59	0.555	108.	60.	
				TOTALS		136.29	2.134			0.20

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 09 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	2	14.	8.	21.	6.21	25.00	43.30	0.8113	0.2565	62.	48.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 09 28 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		—	10.76	1.032	16.	17.	
INSECTA	DIPTERA	CHIRONOMIDAE			5,0	3.59	0.555	108.	60.	
				TOTALS		14.35	1.157			0.10

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 09 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
1	9	656.	0.	0.	0.00	0.00	0.00	2.4051	0.2583	29.	30.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 09 28 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		1	43.04	1.634	21.	34.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	43.04	1.634	21.	34.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	1	53.80	1.731	2.	3.	
INSECTA	PLECOPTERA	CHLOROPERLIDAE			1	10.76	1.032	24.	25.	
INSECTA	PLECOPTERA	PERLODIDAE	ISOPERLA		10	64.56	1.810	48.	87.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		1	333.56	2.523	16.	40.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		1	21.52	1.333	6.	8.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	32.28	1.509	18.	27.	
INSECTA	DIPTERA	CHIRONOMIDAE			10	53.80	1.731	108.	187.	
				TOTALS		656.36	2.817			0.70

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 09 28 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	10	441.	116.	767.	298.97	39.13	67.77	2.3267	0.3040	36.	27.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 09 28 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS			21.52	1.333	21.	28.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA			89.67	1.953	21.	41.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI		53.80	1.731	2.	3.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		50	7.17	0.856	72.	62.	
INSECTA	PLECOPTERA					3.59	0.555	48.	27.	
INSECTA	PLECOPTERA	PERLODIDAE	ISOPERLA		0	21.52	1.333	48.	64.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA			208.03	2.318	16.	37.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE			10.76	1.032	6.	6.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE				3.59	0.555	108.	60.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA			21.52	1.333	18.	24.	
				TOTALS		441.16	2.645			0.40

TOTAL SAMPLE STATISTICS

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 12 04 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	6	43.	20.	66.	21.52	28.87	50.00	2.2213	0.1566	27.	28.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 12 04 84

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		3.59	0.555	30.	17.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		17.93	1.254	21.	26.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		3.59	0.555	24.	13.	
INSECTA	PLECOPTERA	TAENIOPTERYGIDAE	TAENIONEMA		10.76	1.032	48.	50.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		3.59	0.555	16.	9.	
				TOTALS	43.04	1.634			0.10

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 10 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	12	516.	-123.	1156.	587.68	65.69	113.79	2.7182	0.2419	39.	41.

SPECIES ANALYSES

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 10 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS			17.93	1.254	21.	26.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA			93.25	1.970	21.	41.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS			3.59	0.555	48.	27.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS			7.17	0.856	72.	62.	
INSECTA	PLECOPTERA	CHLOROPERLIDAE				10.76	1.032	24.	25.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS			46.63	1.669	24.	40.	
INSECTA	PLECOPTERA	TAENIOPTERYGIDAE	TAENIONEMA			78.91	1.897	48.	91.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA			147.05	2.167	16.	35.	
INSECTA	PLECOPTERA	PERLODIDAE				3.59	0.555	48.	27.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA			3.59	0.555	18.	10.	
INSECTA	DIPTERA	TIPULIDAE	DICRANOTA			3.59	0.555	24.	13.	
INSECTA	DIPTERA	CHIRONOMIDAE				100.43	2.002	108.	216.	
				TOTALS		516.48	2.713			0.50

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 10 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	6	75.	40.	110.	32.28	24.74	42.86	2.2556	0.1439	31.	37.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 10 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	17.93	1.254	21.	26.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		—	7.17	0.856	21.	18.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	—	17.93	1.254	2.	3.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		—	3.59	0.555	16.	9.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		—	3.59	0.555	18.	10.	
INSECTA	DIPTERA	CHIRONOMIDAE			5,0	25.11	1.400	108.	151.	
				TOTALS		75.32	1.877			0.10

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 10 31 84

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	15	334.	-8.	675.	313.52	54.27	93.99	2.8460	0.2839	33.	29.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 10 31 84

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	17.93	1.254	21.	26.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		—	139.88	2.146	21.	45.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	—	17.93	1.254	2.	3.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		—	3.59	0.555	48.	27.	
INSECTA	PLECOPTERA					10.76	1.032	48.	50.	
INSECTA	PLECOPTERA	CHLOROPERLIDAE			—	3.59	0.555	24.	13.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		—	21.52	1.333	24.	32.	
INSECTA	PLECOPTERA	CAPNIIDAE			—	3.59	0.555	32.	18.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		—	60.97	1.785	16.	29.	
INSECTA	PLECOPTERA	PERLIDAE	CALINEURIA			3.59	0.555	24.	13.	
INSECTA	TRICHOPTERA					14.35	1.157	72.	83.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		—	3.59	0.555	6.	3.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		—	17.93	1.254	18.	23.	
INSECTA	TRICHOPTERA	GLOSSOSOMATIDAE	GLOSSOSOMA		—	10.76	1.032	24.	25.	
INSECTA	DIPTERA	CHIRONOMIDAE			5,0	3.59	0.555	108.	60.	
				TOTALS		333.56	2.523			0.40

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK (AT BRIDGE) DATE: 03 06 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	11	183.	14.	352.	155.18	48.98	84.84	3.0435	0.1358	32.	30.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK (AT BRIDGE) DATE: 03 06 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		—	10.76	1.032	21.	22.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	—	50.21	1.701	2.	3.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		S,O	3.59	0.555	72.	40.	
INSECTA	PLECOPTERA	CHLOROPERLIDAE			—T	3.59	0.555	24.	13.	
INSECTA	PLECOPTERA	NEMOURIDAE	PODMOSTA		—	17.93	1.254	12.	15.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		—T	28.69	1.458	24.	35.	
INSECTA	PLECOPTERA	TAENIOPTERYGIDAE	TAENIONEMA		O	25.11	1.400	48.	67.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		—	3.59	0.555	6.	3.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		S	10.76	1.032	24.	25.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		—T	14.35	1.157	18.	21.	
ARACHNIDA	HYDRACARINA				S,O	14.35	1.157	98.	113.	
				TOTALS		182.92	2.262			0.50

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 03 06 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
1	1	22.	0.	0.	0.00	0.00	0.00	0.0000	1.0000	16.	16.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 03 06 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		—	21.52	1.333	16.	21.	
				TOTALS		21.52	1.333			0.10

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 03 06 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	4	39.	12.	67.	24.85	36.36	62.98	1.7899	0.1258	46.	47.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 03 06 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	10.76	1.032	30.	31.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	17.93	1.254	72.	90.	
INSECTA	PLECOPTERA	TAENIOPTERYGIDAE	TAENIONEMA		0	3.59	0.555	48.	27.	
INSECTA	PLECOPTERA	CAPNIIDAE			1	7.17	0.856	32.	27.	
				TOTALS		39.45	1.596			0.10

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 04 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	8	72.	5.	138.	61.18	49.24	85.29	2.5842	0.1697	52.	49.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 04 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	28.69	1.458	30.	44.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		1	7.17	0.856	48.	41.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		S, 0	7.17	0.856	72.	62.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		1	3.59	0.555	16.	9.	
INSECTA	PLECOPTERA	NEMOURIDAE	VISOKA			7.17	0.856	108.	92.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		—	10.76	1.032	6.	6.	
INSECTA	DIPTERA	TIPULIDAE	DICRANOTA		1	3.59	0.555	24.	13.	
INSECTA	DIPTERA	CHIRONOMIDAE			S. 0	3.59	0.555	108.	60.	
				TOTALS		71.73	1.856			0.10

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 04 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	8	75.	33.	118.	38.80	29.74	51.51	2.2586	0.2546	52.	44.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 04 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		3	10.76	1.032	48.	50.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		1	3.59	0.555	24.	13.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		2	7.17	0.856	16.	14.	
INSECTA	PLECOPTERA	NEMOURIDAE	VISOKA		1	3.59	0.555	108.	60.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		11	39.45	1.596	18.	29.	
INSECTA	COLEOPTERA	HYDRANEIDAE	HYDRAENA		1	3.59	0.555	72.	40.	
INSECTA	DIPTERA	CHIRONOMIDAE			1	3.59	0.555	108.	60.	
				TOTALS		75.32	1.877			0.20

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 04 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	7	75.	22.	129.	49.31	37.80	65.47	2.4508	0.1238	42.	38.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 04 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		—→	25.11	1.400	30.	42.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		—	17.93	1.254	21.	26.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		S,D	10.76	1.032	72.	74.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		—	10.76	1.032	16.	17.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE			S	3.59	0.555	108.	60.	
INSECTA	DIPTERA	TIPULIDAE	DICRANOTA		—→	3.59	0.555	24.	13.	
				TOTALS		75.32	1.877			0.10

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	5	36.	6.	65.	27.08	43.59	75.50	2.1219	0.0983	84.	76.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		S, O	7.17	0.856	72.	62.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		S	14.35	1.157	24.	28.	
INSECTA	DIPTERA					3.59	0.555	108.	60.	
INSECTA	DIPTERA	CHIRONOMIDAE			S, O	7.17	0.856	108.	92.	
OLIGOCHAETA					O, S	3.59	0.555	108.	60.	
				TOTALS		35.87	1.555			0.10

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	12	197.	109.	285.	80.76	23.64	40.94	2.6598	0.2648	32.	34.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	32.28	1.509	30.	45.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	1	7.17	0.856	2.	2.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		1	7.17	0.856	48.	41.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		S, D	86.08	1.935	72.	139.	
INSECTA	PLECOPTERA	NEMOURIDAE	PODMOSTA		1	17.93	1.254	12.	15.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		1	7.17	0.856	6.	5.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		S	3.59	0.555	24.	13.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	21.52	1.333	18.	24.	
INSECTA	TRICHOPTERA	GLOSSOSOMATIDAE	GLOSSOSOMA		1	3.59	0.555	24.	13.	
INSECTA	DIPTERA	TIPULIDAE	DICRANOTA		1	3.59	0.555	24.	13.	
INSECTA	DIPTERA	CHIRONOMIDAE			S, D	3.59	0.555	108.	60.	
				TOTALS		197.27	2.295			0.30

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	7	86.	-10.	182.	88.07	59.07	102.32	2.4014	0.1709	44.	43.

SPECIES ANALYSES

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	25.11	1.400	30.	42.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		2,6	10.76	1.032	72.	74.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		1/0	7.17	0.856	24.	21.	
INSECTA	PLECOPTERA	TAENIOPTERYGIDAE	TAENIONEMA		1	28.69	1.458	48.	70.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		1	3.59	0.555	6.	3.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	7.17	0.856	18.	15.	
INSECTA	DIPTERA	CHIRONOMIDAE			2,0	3.59	0.555	108.	60.	
				TOTALS		86.08	1.935			0.20

TOTAL SAMPLE STATISTICS

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	6	36.	-2.	74.	34.59	55.68	96.44	2.3219	0.1502	60.	57.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA			14.35	1.157	30.	35.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS			7.17	0.856	72.	62.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA			3.59	0.555	18.	10.	
INSECTA	DIPTERA	TIPULIDAE	DICRANOTA			3.59	0.555	24.	13.	
INSECTA	DIPTERA	CHIRONOMIDAE				3.59	0.555	108.	60.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA			3.59	0.555	108.	60.	
				TOTALS		35.87	1.555			0.10

TOTAL SAMPLE STATISTICS

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	7	212.	67.	356.	132.80	36.23	62.76	1.4338	0.5074	42.	37.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 16 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	157.81	2.198	30.	66.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		—	14.35	1.157	21.	24.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	10.76	1.032	18.	19.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	10.76	1.032	72.	74.	
INSECTA	PLECOPTERA	PELTOPERLIDAE	YORAPERLA		1	3.59	0.555	24.	13.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		5	10.76	1.032	24.	25.	
OLIGOCHAETA					0,5	3.59	0.555	108.	60.	
				TOTALS		211.81	2.326			0.10

TOTAL SAMPLE STATISTICS

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	2	11.	11.	11.	0.00	0.00	0.00	0.9183	0.0540	24.	23.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		3.59	0.555	30.	17.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		7.17	0.856	18.	15.	
				TOTALS	10.76	1.032			0.10

TOTAL SAMPLE STATISTICS

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
2	2	11.	11.	11.	0.00	0.00	0.00	1.0000	0.1562	24.	24.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	5.38	0.731	30.	22.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	5.38	0.731	18.	13.	
				TOTALS		10.76	1.032			0.10

TOTAL SAMPLE STATISTICS

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	2	7.	0.	14.	8.21	50.00	86.60	1.0000	0.1562	69.	69.

SPECIES ANALYSES

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 25 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	3.59	0.555	30.	17.	
INSECTA	DIPTERA	CHIRONOMIDAE			50	3.59	0.555	108.	60.	
				TOTALS		7.17	0.856			0.10

TOTAL SAMPLE STATISTICS

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	3	11.	11.	11.	0.00	0.00	0.00	1.5850	0.0784	32.	32.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		3.59	0.555	30.	17.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		3.59	0.555	48.	27.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		3.59	0.555	18.	10.	
				TOTALS	10.76	1.032			0.10

TOTAL SAMPLE STATISTICS

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	3	11.	11.	11.	0.00	0.00	0.00	1.5850	0.0784	41.	41.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 25 85

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		—	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		17	3.59	0.555	30.	17.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	3.59	0.555	72.	40.	
				TOTALS		10.76	1.032			0.10

TOTAL SAMPLE STATISTICS

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	15	233.	139.	327.	86.30	21.37	37.02	3.0439	0.2331	44.	46.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		1	3.59	0.555	21.	12.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		11	86.08	1.935	30.	58.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	14.35	1.157	21.	24.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	3.59	0.555	18.	10.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	1	3.59	0.555	2.	1.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	39.45	1.596	72.	115.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		1	7.17	0.856	16.	14.	
INSECTA	PLECOPTERA	PELTOPERLIDAE	YORAPERLA		1	3.59	0.555	24.	13.	
INSECTA	TRICHOPTERA				1	3.59	0.555	72.	40.	
INSECTA	TRICHOPTERA	GLOSSOSOMATIDAE	GLOSSOSOMA		1	14.35	1.157	24.	28.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		5	21.52	1.333	24.	32.	
INSECTA	DIPTERA	TIPULIDAE	DICRANOTA		1	3.59	0.555	24.	13.	
INSECTA	DIPTERA	SIMULIIDAE			10	14.35	1.157	108.	125.	
INSECTA	DIPTERA	EMPIDIDAE			5	7.17	0.856	95.	81.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		0	7.17	0.856	108.	92.	
				TOTALS		233.13	2.368			0.10

TOTAL SAMPLE STATISTICS

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
1	1	11.	0.	0.	0.00	0.00	0.00	0.0000	1.0000	30.	30.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		—1	10.76	1.032	30.	31.	
				TOTALS		10.76	1.032			0.10

TOTAL SAMPLE STATISTICS

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	12	222.	102.	343.	110.43	28.67	49.66	2.9385	0.1891	30.	31.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	50.21	1.701	30.	51.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	50.21	1.701	21.	36.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	3.59	0.555	18.	10.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	1	3.59	0.555	2.	1.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		1	14.35	1.157	48.	56.	
INSECTA	PLECOPTERA	CHLOROPERLIDAE			1	3.59	0.555	24.	13.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		1	7.17	0.856	24.	21.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		13	46.63	1.669	16.	27.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	3.59	0.555	18.	10.	
INSECTA	TRICHOPTERA	GLOSSOSOMATIDAE	GLOSSOSOMA		6	21.52	1.333	24.	32.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		2	7.17	0.856	24.	21.	
INSECTA	DIPTERA	CHIRONOMIDAE			3,0	10.76	1.032	108.	111.	
				TOTALS		222.37	2.347			0.50

TOTAL SAMPLE STATISTICS

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	11	179.	124.	235.	50.85	16.37	28.35	3.0528	0.1339	49.	42.

SPECIES ANALYSES

STATION: 4 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	25.11	1.400	30.	42.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	11	10.76	1.032	2.	2.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		17	17.93	1.254	48.	60.	
INSECTA	PLECOPTERA	PERLODIDAE	SKWALA		1	3.59	0.555	18.	10.	
INSECTA	TRICHOPTERA					3.59	0.555	72.	40.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		1	21.52	1.333	6.	8.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		5	35.87	1.555	24.	37.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	39.45	1.596	18.	29.	
INSECTA	DIPTERA					3.59	0.555	108.	60.	
INSECTA	DIPTERA	CHIRONOMIDAE			5,0	10.76	1.032	108.	111.	
OLIGOCHAETA					0,5	7.17	0.856	108.	92.	
				TOTALS		179.33	2.254			0.50

TOTAL SAMPLE STATISTICS

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	18	904.	78.	1729.	758.03	48.42	83.87	2.9671	0.2941	41.	36.

SPECIES ANALYSES

STATION: 5 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 05 02 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	60.97	1.785	30.	54.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	7.17	0.856	21.	18.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	14.35	1.157	18.	21.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	INERMIS	5	10.76	1.032	48.	50.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	DODDSI	1	104.01	2.017	2.	4.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		1	3.59	0.555	48.	27.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	60.97	1.785	72.	129.	
INSECTA	PLECOPTERA	PERLODIDAE	MEGARCYS		1	25.11	1.400	24.	34.	
INSECTA	PLECOPTERA	NEMOURIDAE	NEMOURA		1	89.67	1.953	24.	47.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	PARAPSYCHE		1	100.43	2.002	6.	12.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	OLIGOPHLEBODES		1 5	358.67	2.555	24.	61.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	14.35	1.157	18.	21.	
INSECTA	TRICHOPTERA	LIMNEPHILIDAE	ECCLISOMYIA		1 5	17.93	1.254	24.	30.	
INSECTA	DIPTERA					3.59	0.555	108.	60.	
INSECTA	DIPTERA	TIPULIDAE	DICRANOTA		1	3.59	0.555	24.	13.	
INSECTA	DIPTERA	TIPULIDAE	HEXATOMA		5	3.59	0.555	36.	20.	
INSECTA	DIPTERA	CHIRONOMIDAE			5,0	17.93	1.254	108.	135.	
INSECTA	DIPTERA	CERATOPOGONIDAE			ch	7.17	0.856	108.	92.	
				TOTALS		903.84	2.956			1.90

TOTAL SAMPLE STATISTICS

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 24 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	9	262.	125.	399.	126.10	27.81	48.16	1.6453	0.4931	43.	47.

SPECIES ANALYSES

STATION: 1 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 24 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	43.04	1.634	30.	49.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	3.59	0.555	18.	10.	
INSECTA	EPHEMEROPTERA	SIPHLONURIDAE	AMELETUS		1	3.59	0.555	48.	27.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		50	175.75	2.245	72.	162.	
INSECTA	PLECOPTERA	PERLODIDAE	ISOPERLA		1	3.59	0.555	48.	27.	
INSECTA	PLECOPTERA	PELTOPERLIDAE	YORAPERLA		1	3.59	0.555	24.	13.	
INSECTA	PLECOPTERA	PERLIDAE				3.59	0.555	24.	13.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		1	17.93	1.254	18.	23.	
INSECTA	DIPTERA	CHIRONOMIDAE			50	7.17	0.856	108.	92.	
				TOTALS		261.83	2.418			0.20

TOTAL SAMPLE STATISTICS

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 24 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	3	29.	-1.	58.	27.08	54.49	94.37	1.2988	0.2264	40.	47.

SPECIES ANALYSES

STATION: 2 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 08 24 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		11	7.17	0.856	30.	26.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	11	3.59	0.555	18.	10.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	17.93	1.254	72.	90.	
				TOTALS		28.69	1.458			0.10

TOTAL SAMPLE STATISTICS

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 24 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA											
3	7	285.	139.	392.	116.06	25.25	43.73	1.9448	0.3190	32.	35.

SPECIES ANALYSES

STATION: 3 YELLOWSTONE PARK SODA BUTTE CREEK DATE: 07 24 86

CLASS	ORDER	FAMILY	GENUS	SPECIES		MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		1	21.52	1.333	21.	28.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA		1	118.36	2.073	30.	62.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	RHITHROGENA		1	7.17	0.856	21.	18.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	COLORADENSIS	1	3.59	0.555	18.	10.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		5,0	89.67	1.953	72.	141.	
INSECTA	PLECOPTERA	NEMOURIDAE	ZAPADA		1	21.52	1.333	16.	21.	
INSECTA	PLECOPTERA	PERLODIDAE				3.59	0.555	48.	27.	
				TOTALS		265.41	2.424			0.20